



## SCIENCE AND ITS IMPACT ON SOCIETY IN THE GUPTA PERIOD

Dr. Kamrujjaman

State Aided College Teacher, Department of History, Samsi College, UGB

### INTRODUCTION

**#Gupta rule is a glorious period in the history of India in terms of civilization and culture. It was not only the creation of political unity and the introduction of good governance that characterized this era. An unprecedented An unprecedented progress in art, literature, science made this era glorious.**

The Guptas emerged as a Paramount power in India in the 4<sup>th</sup> century AD. With the advent of the Guptas, the Period of confusion, conflict and disintegration came to a halt and India became politically united. The Guptas ushered a new era in the history of India. Their rule lasted for more than two centuries. Several Powerful and benevolent Gupts rulerd infused new hope in the Indian civilization and the country developed in all spheres of life. The benevolent Gupta rulers took keen interest in the development of art, architecture, science, technology, education, literature, philosophy, etc.

The advancement of science and technology was the most notable feature of this period. Due to the patronization of the Gupta rulers, the country produced outstanding scholars of repute in various fields like education, science and technology, art and In his Panchsiddhantika, he has given a description of the five systems of astronomy in use in his time. His work on astrology, Brihatsamhita, is a compendium of all available knowledge on technical sciences like architecture, metallurgy, physiognomy, etc. Varahmihira was a man of such a comprehensive mind that there was hardly any branch of natural sciences to which he did not make any contribution.

Brahmagupta, who composed the Brahmasiddhanta, was another famous astrologer of this age. His other works are Brahmasphuta and Khandakhayaka. These works deal with arithmetical equations, square and cube roots and their rules, geometry, elementary and simple algebraic identities. He taught the easier methods of compilation of the longitude of the planets. He anticipated Newton when he declared that 'all things fall to the earth by a law of nature, for it's the nature of earth to attract and keep things'.

Besides this, many scholarly works, such as the Shatpanchasika and the Vaisisthasiddhanta, were also prepared during this age.

### MEDICINE

General medicine, along with veterinary and Ayurvedic medicine, made enormous advancement during the Gupta period. The Indian surgeons were well versed in the art of dissection, plastic surgery, veterinary surgery and even in special branches of surgery as that of eye, ear and nose. Bone setting reached a high degree of skill and plastic surgery developed far beyond anything known elsewhere at that time. In this respect, Indian surgery remained well ahead of European until the 18th

century. Though Indian doctors conceived very early the existence of microscopic forms of life, it was never realized that this might cause diseases. However, the physicians knew the symptoms of many diseases. Vagabhata was the eminent writer of medical sciences of the time. He wrote Astanga-sangrah, which is a systematic summary of charaksamhita and Susrutasamhita.

The knowledge of medical science, which progressed in this period, was available to young man of all castes. Taxila was the centre of advanced learning of medical sciences of the period. The study of medical sciences in this age comprised diverse aspects, such as pathology, medicine, surgery, toxicology, blood test, study of bones, etc.

The whole science was divided into two parts-Shastra (theory) and Prayoga (practice). The student of medicine was required to acquire proficiency in both the aspects. At that time, great emphasis was given on the treatment of Shalya (surgery). Though students received instructions in surgery and medicine from individual teachers, there were institutions with important hospitals attached to them for practical training. In ancient India, the surgeons and physicians had a very high standard of knowledge and their name spread even to distant foreign countries. In the 8th century, the Khalif of Arabia had invited physicians to undertake teaching of medical science in state hospitals. Khalifa Harun also sent several scholars to India to study Hindu medicine and pharmacology and induced about 20 doctors to come to Baghdad to become chief medical officers of state hospitals and to translate ancient Indian Sanskrit medical works into Arabic. Most celebrated among them was Manaka architecture, which rose to the pinnacle of their heights during the period. So, the Gupta period is also known as the Classical Age or the Golden Age of ancient India.

### Progress of Science and Technology

Like several other fields, the field of science and technology made tremendous progress during the Gupta period. Many scholars of science, astronomy, astrology, medicine, metallurgy and geometry emerged during the Gupta period and they contributed immensely to the development of science and technology of this age.

The great scholars of the period not only occupied a high place in history of India, but also of the whole world. Their researches in arithmetic, astronomy and medicine guided scientists in other countries for centuries, which exercised a direct influence on scientific thought in Arabia, and other central Asian countries and indirectly influenced European countries.

Among the notable astronomers and mathematicians of the Gupta age, Aryabhatta has been accepted as the most prominent. A few of his works such as Aryabhatiyam, Dasagitikasutra and

Aryashtasata have come down to us. He was the first to treat mathematics as a distinct subject of science. His most prominent achievement was the discovery of the principals of the place value of the first 9 numbers and the use of 'Zero', which simplified arithmetic calculations and brought a revolution in this field. He gave a value for 'pie', 3.1416, more accurate than any one suggested before him. He also calculated the length of the solar year to 365.3586805 days. It is remarkably close to the recent estimates.

It was largely due to his efforts that astronomy was recognized as a separate discipline from mathematics. He was the first Indian astronomer to declare that the earth was a sphere, which revolves round the sun and rotates round its axis. He was also the first Indian scientist who described the true causes of solar and lunar eclipses and the method of calculating them precisely. His calculation of the size of earth is very near to that estimated by modern astronomers.

Among his writings, the Aryabhatiyam became the most famous in which he found solutions to many problems of algebra, geometry, trigonometry, etc. It is also believed that the decimal system was discovered during this period either by Aryabhatta or Varahmihira as both of them have described it in their works. Due to these great scientific discoveries, Aryabhatta has been deservedly called the father of the astronomical science in India.

Bhaskara I wrote commentaries on the writings of Aryabhatta and several other independent works also. Among his writings, the Mahabhaskarya, the Laghubhaskarya and the Bhasya became more renowned. Certain other scholar. such as Lata, Pradyumna, Vijayanandin, contributed further to what Aryabhatta did and ultimately Varahmihira took all that to the peak.

Varahmihira was second only to Aryabhatta in Indian astronomy. His work on astrology the Brihatsamhita is an encyclopaedia of information in various branches of knowledge. Among his other writings, the Panchsiddhantika, the Brahmajataka and the *Laghujataka* are noteworthy.

(Manikya), who was originally invited to cure an ailment of Sultan Harun, which challenged the skill of Arabic physicians. He succeeded in his treatment and was later induced to become the director of state hospitals and translate the work of Susruta into Arabic. The arabic system of medicine owes a great deal to the Indian Ayurvedic system.

### Veterinary Science

Along with medicine, the veterinary science also progressed considerably during that period. However, veterinary science had been developed in India much before the Gupta period. During Gupta period, it got proper attention of researchers.

Since animals were regarded as a part of the same cosmos as humans, it is not surprising that animal life was keenly protected and veterinary medicine was a distinct branch of science with its own hospitals and scholars. Salihotra was the great scholar of this science. It is believed that the two Pandava brothers, Nakula and Sahdeva, were the experts of the diseases of the horse and their cure.

During that period, Palakapya wrote Hastayurveda (the Science of Prolonging Elephant Life), a treatise on the diseases peculiar to elephants and their treatment. Asvasastra was another great work in the field of medical science and it is a treatise on the diseases of animals, which proves that veterinary science

progressed tremendously during the Gupta period. However, some historians believe that during Gupta age, there was no regular veterinary institutions to impart education in it. Probably students learned it from the experts of veterinary science.

According to Stanley Wolpert. 'Veterinary science had developed into an Indian medical specialty by that early era, and India's monarchs seem to have supported special hospitals for their horses as well as their elephants. Hindu faith in the sacrosanctity of animals as well as human souls, and belief in the partial divinity of cows and elephants, helps explain perhaps what seems to be far better care lavished on such animals.'

### Ayurveda

The knowledge of ayurveda flourished during this period, which is still practised by the physicians of the present day. The basic concept of Indian medicine was believed to be the humours (dosha). Most ayurvedic practices taught that health was maintained through the even balance of three vital fluids of the body wind, gall and mucus. The following five winds (Vayu) maintained the bodily functions:

1. Udana (emanating from the throat and causing speech)
2. Prana (in the heart and responsible for breathing and swallowing of food)
3. Samana (fanning the fire in the stomach, which cooks and digests the food and divide it into its digestible and indigestible parts)
4. Apana (in the abdomen and responsible for excretion and procreation)
5. Wana (a generally defused wind causing the motion of the blood and the body)

The system of ayurveda of this period describe that the food digested by the Samana Vayu proceed from the heart and the essence of the food proceed to the liver where its essence is converted into blood. The blood in turn is converted into flesh and the process continues through the series of fat, bone, marrow and the semen. The semen when not expelled produces energy, which returns to the heart and is diffused over the body. This process of metabolism is believed to take place in thirty days, which is still practical in the modern day medical science. Probably. Dhanavantari, the most renowned physician of ayurvedic medicines, flourished during this age.

### Metallurgy, Chemistry and Physics

The science of metallurgy, chemistry and physics also flourished during the Gupta period. Unfortunately, no books on these subjects have been discovered, but there is absolutely no doubt that metallurgy and chemistry made a remarkable progress during the Gupta period. The famous Iron pillar near Qutab Minar in Delhi belongs to this age. This Iron pillar is a living example of the progress in the field of metallurgy of the period. This huge pillar is made up of iron, 24 feet high, and weighs seven and half tones. It is so skilfully manufactured that in spite of its exposure for centuries to sun and rain, it shows no sign of rusting and corrosion, which is surprising to even modern metallurgists as to how it was prepared. This is the best proof of the progress made in the field of metallurgy during the period. The discovery of several gigantic copper status of Buddha also represents the advanced metallurgical skill of the Gupta age.

During this period, the use of mercury and iron with proper treatment for the preparation of medicines was prevalent. Writers like Varahamihira have mentioned this in his treatises. The close association of medicine and chemistry, which was to achieve great progress in the later period, began during the Gupta

period. Nagarjuna, the famous Buddhist scholar, was also a great scholar of medicine, chemistry and metallurgy. He discovered many new medicines.

Thus, the Gupta age witnessed the highest progress in the field of science in general and astronomy and medicine in particular. It was an age of intellectualism, which led to remarkable progress, new inventions and innovations in every field of learning and specifically in the field of sciences.

#### REFERENCES

1. 'RECORDS OF THE GUPTA DYNASTY' -Edward Thomas.
2. 'THE GUPTA EMPIRE' - Radha Kumud Mookerji.
3. 'GUPTA EMPIRE' - RANJAN JAYAVANT.
4. 'THE OF THE IMPERIAL GUPTAS' - R.D. BANERJI.
5. 'Ancient and Medieval India'- Poonam Dalal Dahiya.
6. 'A History of Ancient and Early Medieval India: From the Stone Age to the 12th Century' - Upinder Singh.